REMARKS

Claims 1-20 are pending in this application. Claims 1 and 5 are rejected under 35 USC 102 as being anticipated by Manning. Claims 11 and 12 are rejected under 35 USC 102 as being anticipated by Vance. Claims 2-4, 6 and 7 are rejected under 35 USC 103 as being unpatentable over Manning. Claim 8 is rejected under 35 USC 103 as being unpatentable over Manning in view of Merrill. Claim 9 is rejected under 35 USC 103 as being unpatentable over Manning in view of Lee. Claim 10 is rejected under 35 USC 103 as being unpatentable over Manning in view of Lee. Claim 13 is rejected under 35 USC 103 as being unpatentable over Vance in view of Lee. Claim 17 is rejected under 35 USC 103 as being unpatentable over Vance in view of Manning. Claim 19 is rejected under 35 USC 103 as being unpatentable over Lee in view of Vance. Claim 20 is rejected under 35 USC 103 as being unpatentable over Lee in view of Vance and further in view of Manning.

Independent claim 1 has been amended herein to add the limitations that "the filler powder particles comprise an average size of at least 30 microns and exhibit micro-cracks contained within the particles and not propagated into the binder material." These amendments overcome the rejection of claim 1 under 35 USC 102(b) as being anticipated by Manning since Manning specifically limits the size of his zirconia/hafnia particles to less than 15 microns (see Abstract). The applicant explains the criticality of the particle size in the present specification beginning on page 4, line 28. The present inventor specifically processes the zirconia-hafnia powder to increase its particle size to at least 30 microns to avoid the migration of the particles between particles of the binder material, or when the composition is used as a coating, to the coating/substrate interface. Thus, Manning teaches away from the amended claim 1.

Furthermore, as the size of the particles increases, the opportunity for micro-cracking within the particle due to differential thermal expansion between the zirconia and the hafnia will increase, since it is generally known that larger objects are more vulnerable to internal stress concentration and are more prone to cracking than smaller objects. As described in the present specification beginning at page 5, line 17,

the present invention takes advantage of this micro-cracking to lower the elastic modulus of the material, without causing weakening of the material caused by cracks extending into the binder material. Manning discusses micro-cracking, however, the micro-cracking described by Manning is within the glass matrix material, and thus is undesirable and is specifically avoided by Manning as described at column 3, line 45 and column 4, line 17. Accordingly, Manning does not anticipate the in-particle micro-cracking of amended claim 1 and he actually teaches away from the desirability of micro-cracking in general. Thus, amended claim 1 and its dependent claims 2-10 are believed to be in condition for allowance.

With regard to claim 5, the applicant notes that the composition of Manning does not describe composite particles, but rather he describes particles of alumina-hafnia and separate particles of alumina. The applicant appreciates that the language of Manning is somewhat confusing in this regard, but a close reading of the Summary of the Invention reveals the proper interpretation. Specifically, column 1, line 65 begins by describing a mixture containing particulate alumina (Al_2O_3) and particulate zirconia (ZrO_2); i.e. two separate particles. At column 2, line 1 Manning explains that all or part of the particulate zirconia may be replaced by particulate hafnia (HfO_2) or a particulate form of a solid solution of hafnia and zirconia; i.e. particles that are still separate from the particulate alumina. Thus, Manning fails to anticipate the composite particles of claim 5 wherein each particle contains zirconia-hafnia and alumina.

Independent claim 11 has been amended to include the limitation of "composite particles comprising alumina and monoclinic zirconia-hafnia." Vance fails to anticipate such composite particles for two reasons: first, the layer 1 of Vance does not contain particles since it is applied by a thermal spray process or by EB-PVD; and second, the layer 1 of Vance contains no alumina. Furthermore, as explained above, Manning also fails to describe a composite particle comprising zirconia-hafnia and alumina. Thus, the present amendments overcome the rejection of claims 11 and 12 and place independent claim 11 and its dependent claims 12-16 and 18 in condition for allowance.

With regard to the rejection of claim 8 in view of Manning and Merrill, the applicant again notes that neither of these two references describes a composite

particle comprising zirconia-hafnia and alumina. Manning provides alumina as a separate particle, thereby teaching away from the limitations of claim 8.

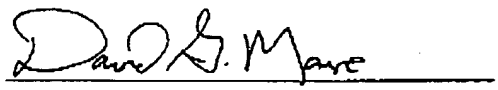
With regard to claim 10, the applicant describes the criticality of preventing a phase transition from monoclinic to tetragonal to no more than 20% of the thickness in the specification beginning at page 2, line 30 in order to avoid a concern for spalling. Neither Manning nor Lee recognizes this problem or provides this solution, thus providing an additional basis for the allowability of claim 10.

Independent claim 19 has been amended to include the limitations of "an overlayer comprising composite particles comprising zirconia-hafnia and alumina." Neither Lee nor Vance describes such composite particles containing alumina, thereby placing claim 19 and its dependent claim 20 in condition for allowance.

Claim 20 has been amended to include the limitations of "the composite particles comprise zirconia-hafnia and a mol percentage of alumina such that the particles exhibit an elastic modulus of approximately 150 GPa." As described in the present specification beginning at page 4, line 21, the elastic modulus of the material will vary with the ratio of the constituents, and it is critical for the claimed combination to have the elastic modulus of the composite particles to be approximately 150 GPa in order to approximate the elastic modulus of the underlying mullite-containing insulating layer. Thus, these limitations provide an additional basis for the allowance of claim 20

Reconsideration of the amended application in light of the above Remarks and allowance of claims 1-16 and 18-20 are respectfully requested.

Respectfully submitted,



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